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M-TRAC

for rail safety

SUBMISSION
to the
GOVERNOR IN COUNCIL

in the matter of
an EXPLOSION AND FIRE
in the CANADIAN PACIFIC RAIL YARD
at WINNIPEG, MANITOBA, on DECEMBER 13, 1982

and in the matter of
a PUBLIC INQUIRY
by the RAILWAY TRANSPORT COMMITTEE
of the CANADIAN TRANSPORT COMMISSION

and in the matter of
the DECISION
of the RAILWAY TRANSPORT COMMITTEE
of JANUARY 30, 1984

M-TRAC

for rail safety

Government
Publications

METRO TORONTO RESIDENTS' ACTION COMMITTEE

181 University Avenue, Suite 1802, Toronto, Ontario, M5H 3M7

Telex 065-24481

Phone (416) 365-0301

November 20, 1984

Mr. G. F. Osbaldeston
Clerk of the Privy Council
Houses of Parliament
Ottawa K1A 0A3

Dear Mr. Osbaldeston,

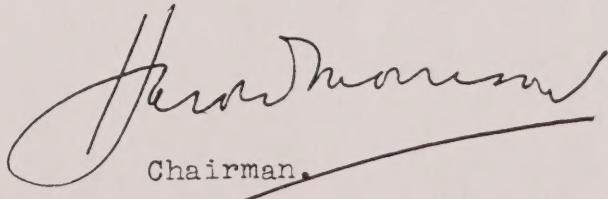
Attached is our submission to the Governor in Council concerning the conduct and decision of the Railway Transport Committee investigating the explosion and fire in the Canadian Pacific Winnipeg yard which occurred on December 13, 1982. The decision is dated January 30, 1984.

It is the view of the M-TRAC directors, supported by the emergency response forces, that the conduct and decision of the RTC panel was deficient in the protection of the public against the risks arising from the unregulated nature of marshalling, humping and speeds of tank cars placarded EMPTY and last containing dangerous goods, specifically in high-density areas.

The documentation and appendices have been kept to a minimum. Further documentation can be provided if required. The full transcript of the proceedings in Winnipeg is available in the Railway Transport Committee.

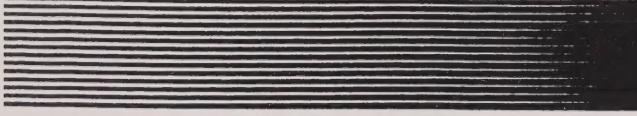
It should be brought to the attention of the Governor in Council that the matter of the conduct and decision of the RTC panel was placed by M-TRAC before the Review Committee of the Canadian Transport Commission and the Review Committee decided that M-TRAC's complaints were unjustified, although M-TRAC was given no opportunity to appear. The Review Committee made no effort to seek the documentation available to M-TRAC, nor would it disclose the basis of its conclusion that the complaints were totally unjustified.

Yours sincerely,


Chairman.

cc: Hon. Don Mazankowski PC MP
Minister of Transport





M-TRAC

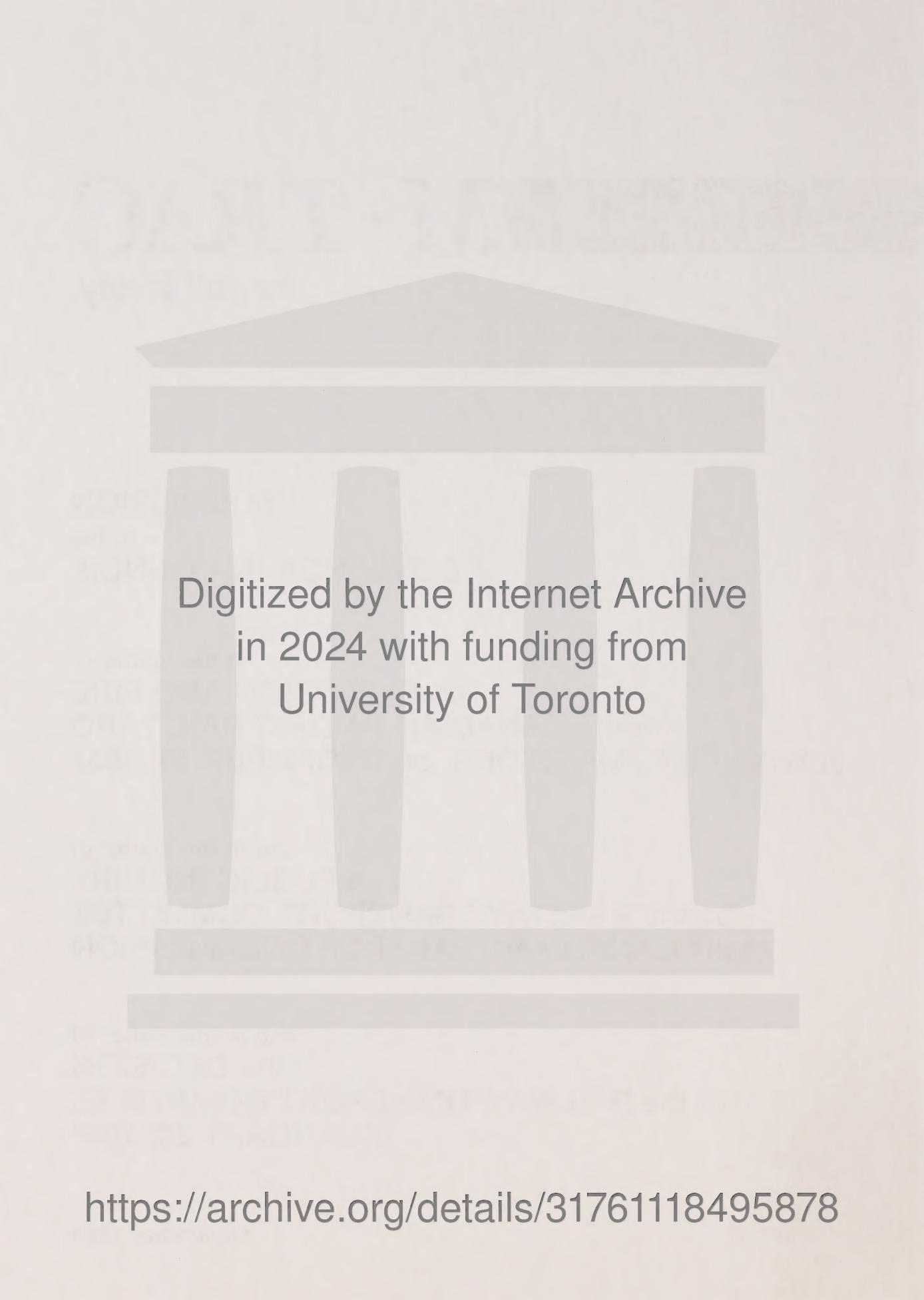
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TO THE GOVERNOR IN COUNCIL,

I N T R O D U C T I O N

From the Report of Mr. Justice Samuel Grange following the Mississauga derailment of 1979:

"The railways have authority in the absence of CTC orders to set speed limits and have taken full advantage of it."

"A long, fast train is a profitable one; it is not necessarily a safe one."

"The railways are answerable to their shareholders; the CTC is answerable to the public."

- - -

M-TRAC for rail safety is an umbrella organization representing some 25 ratepayers' associations in the Metropolitan Toronto area, formed after the Mississauga derailment of 1979 and supported by grants from the municipal governments of Metropolitan Toronto and by the Ontario government, as well as the ratepayers' groups. M-TRAC directors act voluntarily without pay. M-TRAC participated in the Mississauga investigation by Mr. Justice Grange and has been a Party of Record at public inquiries by the Railway Transport Committee of the Canadian Transport Commission.

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C O N T E N T I O N

M-TRAC was a Party of Record at the RTC public hearing following the December 13, 1982, collision, explosion and fire in the Canadian Pacific Winnipeg yard involving tank cars labelled EMPTY and last containing propane. As a result of the explosion, one tank car placarded EMPTY massively disintegrated with portions of the shell propelled distances of between 600 and 1,100 feet. Several railway employees were injured. Damage to railway tank cars, locomotives and track was extensive.

It has been the contention and pleading of M-TRAC since the Medonté Township derailment of February 1982 that the chemical EMPTY tank cars last containing dangerous goods--which can proceed through high-density areas at unregulated speeds--expose the public to serious risks and should be treated as LOADED cars for safety purposes. This pleading has been supported by emergency response officials, including the organizations representing the fire chiefs of both Canada and the United States. The U.S. Department of Transportation now has given notice of intention to relabel the EMPTY chemical tank cars and replace the EMPTY placard. These placards have been described by fire chiefs in both Canada and the United States as misleading and dangerous, especially to firefighters seeking to control chemical spills, explosions and fires.

On February 1, 1983, Mr. John Magee, Chairman of the Railway Transport Committee, wrote to Mayor Arthur Eggleton of the City of Toronto making a firm commitment that the RTC panel established in Winnipeg for the purpose of investigating the Dec. 13, 1982, CP Rail yard accident would make a thorough examination of the matter of the EMPTIES in respect of dangerous commodity cars and that the panel would have the power to decide "on new measures that may be required to strengthen further our rail safety regulatory program." (See Appendix I)

Having received a copy of Mr. Magee's letter from Mayor Eggleton, M-TRAC requested Professor Douglas Napier of the University of Toronto to look into the matter of the chemical EMPTIES and prepare an analysis or opinion which was subsequently submitted to the RTC panel over which Commissioner B. R. Wolfe presided. (See Appendix II)

At various stages of the RTC public hearing spread over the period Feb. 16-May 17, 1983, M-TRAC was represented by Harold Morrison, chairman; Harry Behrend, deputy chairman; Rose Dyson, director. Dr. Napier appeared as a witness and gave evidence under cross-examination. Other witnesses whose evidence dealt to some degree with the chemical EMPTIES include Eugene Kunz of St. Charles, Mo.; Wilmer Karaskewich of the RTC staff, and Deputy Fire Chief S. E. Johnson of Winnipeg.

Mr. Kunz, a tank car consultant closely linked with the Association of American Railroads, was hired by the RTC panel. Mr. Karaskewich is the RTC officer in charge of regulation compliance. Deputy Fire Chief Johnson was in charge of the firemen on the night of the CP yard explosion and fire.

It became apparent to the M-TRAC representative soon after the public hearing opened on Feb. 16, 1983, that the RTC panel did not intend to honour the commitment made by Mr. Magee to Mayor Eggleton. At one point Commissioner Wolfe ordered an RTC witness not to respond to questions dealing with monitoring, speeds and inspections of the chemical EMPTIES outside the Winnipeg yard. (See Appendix III)

Shortly after the first adjournment on Feb. 18, 1983, the M-TRAC representative (Mr. Morrison) telephoned Mr. Magee in Hull, Quebec, to inform him what had transpired at Winnipeg and asked that he be allowed to appear before Mr. Magee to register a formal complaint. Mr. Magee stated on the telephone that this would not be necessary; that Mr. Morrison should write and that Mr. Magee would handle the matter from there. That letter led to a threat of a contempt action by the RTC panel.

In the course of issuing his contempt threat on March 2, 1983, Commissioner Wolfe made a statement in the hearing room and prepared copies for the press in which he claimed that the M-TRAC case for regulating the chemical EMPTIES had been fully aired before the RTC Show Cause hearing of 1981 and had been rejected by the RTC. This statement was wholly untrue. The issue of the chemical EMPTIES did not arise at the 1981 Show Cause hearing.

The statement issued by Commissioner Wolfe contained at least one serious error in fact. It also raised suspicion and cast doubts about the integrity of the M-TRAC organization. Further, the false claim intensified M-TRAC views that the RTC panel in Winnipeg did not intend to make a full investigation of the chemical EMPTIES as promised by Mr. Magee. When M-TRAC stated that Commissioner Wolfe had issued and caused to be widely distributed an error in fact, Mr. Wolfe refused to issue a statement of withdrawal. He merely turned comment over to RTC counsel, Mr. Keith Thompson, who responded that he will accept M-TRAC's statement. To the very last day of the hearing on May 17, 1983, Commissioner Wolfe refused to issue a statement of withdrawal or to apologize for the error in fact. He would only allow Mr. Thompson to respond and that response does not clear Commissioner Wolfe of his personal responsibility for the statement he had uttered and caused to be distributed widely in the press.

(See Appendix IV)

As the hearing proceeded, with numerous adjournments, M-TRAC representatives sensed that the evidence by both the RTC investigators and the CP Rail witnesses concerning the EMPTY tank car which had exploded was incomplete. Certain photographs relating to the car which disintegrated were obviously missing from a CP Rail briefing document filed as evidence. When M-TRAC called the panel's attention to the missing photographs, Commissioner Wolfe ruled that CP Rail did not have to submit these photographs if it did not wish to do so.

When M-TRAC finally unearthed photographs of the exploded tank car--through the co-operation of the Winnipeg Free Press--a senior CP Rail witness changed his testimony in midstream. When M-TRAC managed to have the photographs accepted as evidence, Mr. Thompson, RTC counsel, threatened to have this evidence purged on the basis of a legal technicality. The co-operation of the RTC panel in seeking the full truth of the accident was becoming strained. (See Appendix V)

The photographs demonstrated that a portion of the written reports by the two RTC investigators, Mr. Elvin Boggs and Mr. Karaskewich, was in error. And the same error, describing the location and the condition of the exploded tank car, showed up in a signed and calibrated engineer's drawing entered as evidence by CP Rail. To the astonishment of M-TRAC, Commissioner Wolfe advised CP Rail to downgrade the engineer's drawing to that of a rough sketch. CP Rail agreed. Later, when M-TRAC indicated that the RTC investigators be recalled to the witness stand to explain the obvious conflict in evidence, Commissioner Wolfe refused to recall them. In the M-TRAC view it is therefore unfair and inaccurate for Commissioner Wolfe to have written in his Decision dated Jan. 30, 1984, that the investigators and their reports "withstood" testing under cross-examination. (Decision: Page 6)

Moreover, while in the witness box under cross-examination Mr. Karaskewich, who arrived in Winnipeg about midnight on the night of the accident, claimed that by the time of his arrival the debris of the disintegrated tank car had been picked up and taken away. Senior CP Rail witnesses, who were at the accident site, countered that Mr. Karaskewich's statement was not correct.

These witnesses stated that Mr. Karaskewich was present long before the debris was taken away the following morning.

One further statement by Mr. Karaskewich--that he could not comment on the disintegration and the shell fragments because metallurgical tests had not yet been completed--remained unresolved. M-TRAC searched diligently through the RTC Decision for reference to the results of the metallurgical tests. There was no reference to such tests whatsoever.

Metallurgical testing is an important aspect of tank car investigation, especially in the case of massive disintegration in subzero weather, raising the possibility of steel out of specification and brittle failure which may have contributed to the explosion. To the extent that there was no reference in the Decision on the results of metallurgical testing, M-TRAC roundly condemns the RTC panel for its obvious failure.

In the view of M-TRAC, the manner in which the Winnipeg public hearing was conducted was deficient and more concerned with the discovery of the railway employee who set off the locomotive consist that led to the explosion and fire than in finding solutions relating to the handling of chemical EMPTIES in operational traffic outside the Winnipeg yard.

In addition to the damage resulting from the explosion and fire reported by the RTC investigators, M-TRAC discovered that the couplers linking the dangerous goods EMPTIES had cracked in the collision and explosion. No mention of this was made in the investigators' reports. When M-TRAC sought to question senior railway officials about the matter, the panel objected.

Commissioner J.F. Walter who sat with Commissioner Wolfe and Commissioner R. J. Orange on the panel interjected with these words: "Shelf couplers had no application in this accident whatsoever." There were further harassment and outbursts by Commissioner Walter in the course of that cross-examination. And yet when the RTC's own hired witness, Mr. Kunz, referred to coupler problems and remarked how well the couplers had remained intact during a major derailment in Livingston, La., in 1982, he was allowed to deliver a full statement without interference.

Later, when M-TRAC was able to check Mr. Kunz's statements with the National Transportation Safety Board in Washington and obtained a signed official report from the Board stating that many of the couplers had broken and had been wrenched off during the Livingston derailment, the RTC Winnipeg panel refused to allow that report as evidence.

The panel also refused to allow M-TRAC to file as evidence a letter from the Ontario government which urged a full investigation into the chemical EMPTIES.

A more disturbing consequence of the manner in which the Winnipeg public hearing was conducted was the inadequacy of the RTC Decision dated Jan. 30, 1984. The RTC judged that there was no reason to change regulations pertaining to the chemical EMPTIES because it found that those regulations had not led to the explosion and fire.

The RTC finding that the chemical EMPTIES were not as dangerous as LOADED cars was based solely on the evidence of Mr. Karaskewich, an RTC employee, and Mr. Kunz, a consultant hired by the RTC. It ridiculed the views of Professor Napier because he had used an example of a schoolboy experiment to explain highly technical chemical actions to the panel. The RTC Decision made no mention at all of the Winnipeg Deputy Fire Chief, S.E. Johnson, who stated under cross-examination that the chemical EMPTIES can be as dangerous and even more dangerous than LOADED cars. Chief Johnson also conveyed the views of the Canadian Association of Fire Chiefs but again there was no reference in the Decision to such views, or the views of the International Association of Fire Chiefs which were also brought to the panel's attention.

Mr. Kunz delivered his testimony before the photographs of the damaged tank EMPTY were discovered and he responded to theories of what might have happened as postulated by Mr. Thompson, RTC counsel. It should have been clear after the photographs were discovered and introduced that Mr. Thompson's theories were in jeopardy and may have been a factor in his eagerness to have the photographs purged.

Clearly, the photographs could have led to a reasonable conclusion that the tank car had exploded on impact and the internal explosion was of sufficient power--even though the tank car was labelled EMPTY--to propel the shell some distance from the track and to set it down, in two parts, on two separate parallel tracks.

Indeed, a senior CP Rail witness, testifying to the effect that the RTC investigators reports and the CP Rail engineer's drawing were accurate on the location and condition of the damaged tank car, immediately change his evidence and stated that the photographs were correct and the investigators reports and the CP Rail drawing were not. (See Appendix VI)

The curious element in this portion of the investigation is that the same error, dealing with the location and condition of the damaged car, showed up both in the RTC investigators report and the CP Rail engineer's drawing. How, you may ask, is this possible without some form of interrelationship? Did the investigators and railway officials meet and agree on how to describe and locate the damaged car? And if so, for what reason?

Specifically, the RTC investigators report stated on page 7: "The shell of the tank car PxPX 33104 ruptured and landed north of Track N-14 straddling 3 tracks in a northwest, southeast position." This is the exact manner of location depicted by the CP engineer's drawing. The drawing showed one end of the tank damaged with the bulk of the body remaining intact.

This would seem to support Mr. Thompson's theories that the explosion did not occur in the tank (as Professor Napier theorized) but had occurred in the atmosphere above the tank car and that debris of the damaged car had been propelled laterally by this atmospheric explosion.

In contrast, the photographs showed that the tank car had virtually split into two parts, with the two portions lying on parallel adjoining tracks and separated by some 20 or 30 feet, the bulk of the tank having been propelled through the air a distance of some 60 feet from the original track. When M-TRAC brought this phenomenon to the attention of Mr. Wilber Walls of the National Fire Protection Association , he concluded that the explosion was an IMPACT BLEVE. Mr. Walls is well known among emergency response forces both in Canada and the United States and is the originator of the BLEVE concept. His views were brought to the attention of the Winnipeg panel but the panel showed no interest.

The RTC Decision did make two references relating to the dangers of the chemical EMPTIES. The RTC requested a designated storage area in the Winnipeg yard for the chemical EMPTIES and it requested that its staff make a formal definition of the EMPTIES as containing two per cent or less of original content. It made no recommendations relating to the speed of the EMPTIES or their handling in marshalling or humping yards, or their inspection and placarding. We believe that this lack of regulation and control over the EMPTIES , allowing their treatment as ordinary box cars, was evident in the Toronto MacMillan yard where a chemical EMPTY exploded on Feb. 28, 1984.

C O N C L U S I O N

In terms of discovery of the full truth of an accident of major importance and in terms of seeking all reasonable means of protecting the public, M-TRAC views the conduct and Decision of the Winnipeg RTC inquiry as deficient.

To the extent that the Chairman of the Railway Transport Committee is the Chief Executive Officer of the RTC, a commitment made by such an officer must be the commitment of the RTC. It is detrimental to public trust to observe the commitment of the Chief Executive Officer overridden or ignored by a panel established in the RTC to rule as the RTC in one specific investigation.

In the event that the Governor in Council finds that the Winnipeg panel showed ineptitude, predetermination or deficiency, it is the view of M-TRAC that consideration be given to a separation of powers within the Canadian Transport Commission, to the extent that the investigative process be completely separated from the regulatory structure, as recommended by Mr. Justice Charles Dubin in the matter of investigations of aircraft accidents.

- - -

OTTAWA K1A 0N9, Canada.

February 1, 1983.
68467

Arthur C. Eggleton, Esq.
Mayor
The City of Toronto
City Hall
TORONTO, Ontario.
M1H 2N2

RECEIVED FEB 7 1983

Dear Mayor Eggleton:-

I wish to thank you for your letter of January 12 and to assure you that the matter of "empties" in respect of dangerous commodity cars will be thoroughly examined by the Railway Transport Committee as part of its public inquiry into the accident in CP Rail's marshalling yard at Winnipeg. The inquiry opens on February 16 and a copy of the official Notice of Public Hearing is attached for your information. In particular, all of item 3 on page 2 and all of item 5 on page 3 will be of interest. Also attached is a copy of the earlier statement that we gave to the media, announcing the inquiry.

I greatly appreciate the position set out in your letter in the penultimate paragraph on page 1. The known circumstances of the accident in the Winnipeg yard call up possibilities in respect of railway yards in many cities of Canada. To attempt to conduct hearings in all cities would be repetitious and, more importantly, would delay seriously such additional safety measures as in the view of the inquiry panel, should go into effect.

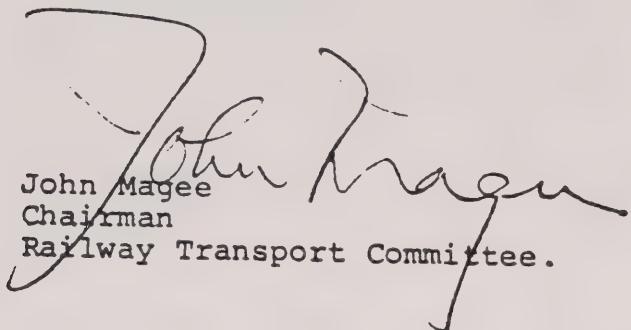
The panel, incidentally, has been established so that it will, in legal fact, sit as the Railway Transport Committee: it will decide, as the Committee, on new measures that may be required to strengthen further our rail safety regulatory program; the panel will itself issue the Committee

.... 2

Canada

Orders deemed necessary in the circumstances that come to light at the inquiry hearings.

Yours sincerely,


John Magee
Chairman
Railway Transport Committee.

att: (2)

RAILWAY TRANSPORT COMMITTEENOTICE OF PUBLIC HEARING

TAKE NOTICE that the Railway Transport Committee of the Canadian Transport Commission will hold a public inquiry into a railway accident that occurred on December 13, 1982 at Winnipeg, Manitoba wherein six Canadian Pacific Rail diesel locomotives, being assembled in a six-locomotive consist ("the consist") on Track #1 on the east end of the railway company's Winnipeg Diesel shop, moved west resulting in a side collision with another group of locomotives, whereupon the consist stopped, then moved east, accelerating to a high rate of speed, ran through two switches and a crossover, and collided with the west end of a group of 38 cars, sitting in yard track N-14 opposite mileage 1.72 Carberry Subdivision, some 600 feet east of the McPhillips Street underpass, with a resultant explosion and fire; the accident caused injuries to several railway employees and damage to six diesel locomotives, five rail cars and approximately 400 feet of track (tracks N-13 and N-14).

WITHOUT LIMITING the general scope of the inquiry or necessarily establishing the sequence of subjects to be examined during the inquiry, the Commissioners conducting the inquiry intend to examine the following matters and such other issues as they may deem relevant to the subject accident:

1. Shop track practices

- (a) instructions re securing of unattended locomotives and locomotives being serviced;
- (b) training;
- (c) instructions re use of safety control valve;
- (d) emergency brake valve (locomotive);
- (e) use of RTC regulations - Rule 26 UCOR - Blue Flag - safety control GO-021 rule 30.

2. Events leading to accident

- (a) testimony from each employee on duty on the shop track and directly involved with servicing the diesel consist which moved from the shop track;

- (b) testimony from others who observed the locomotives moving and who may be able to shed light on the accident.

3. Handling of Dangerous Goods in the Winnipeg Yard

- (a) precautions observed in switching trains with dangerous goods loads;
- (b) practice in storing dangerous goods loads which originate or terminate at Winnipeg or which are taken off trains at Winnipeg for other reasons;
- (c) precautions observed to ensure that dangerous goods cars are not temporarily stored on tracks where they may be subject to heavy impact from other rolling stock;
- (d) the handling of "empty" dangerous goods cars - storing - switching - special handling.

4. Steps taken by CP to avoid a recurrence of the December 13, 1982 Accident

- (a) instruction of employees re safety control (dead-man pedal);
- (b) instruction re use of emergency valve in locomotive cabs;
- (c) instructions re handling of locomotives on shop tracks - responsibility and supervision;
- (d) consideration of the need for blue flag protection;
- (e) consideration of the need for measures on shop tracks to prevent locomotives moving unintentionally on to other tracks;
- (f) designation of special tracks for temporary storing of dangerous Goods Cars (loads or empties) which are away from the general yard operation, which are reserved for such use and which are located to give easy access to fire fighting and emergency equipment.

5. The inherent danger in "empty" dangerous goods tank cars (not purged but containing various quantities of residue lading)

- (a) the danger of empty cars vis-à-vis loaded cars;
- (b) an attempt to determine if there is a relatively safe level of residue short of purging the car;
- (c) consideration of a method whereby the Commission might monitor or regulate the amount of residue lading in an "empty" car for shipment;
- (d) methods of conditioning "empty" cars so as to reduce the risk of explosion or fire from residue lading.

THE INQUIRY intends to hear submissions from the public as well as from persons appointed by the Railway Transport Committee under s. 226 of the Railway Act to inquire into the subject accident, from other members of the Committee's staff, and officers and employees of the railway as well as from other persons possessing expertise touching upon relevant aspects of this matter. It is not within the scope of the present inquiry to decide on the location of a railway yard but only on measures which might be adopted in order to make operations therein safer in future.

THE INQUIRY will commence at 10 A.M. on Wednesday, February 16, 1983 at the Holiday Inn, 350 St. Mary Avenue, Winnipeg, Manitoba.

Any party wishing to give evidence or to address the Commission in French may do so and the Commission, upon notification by the party of his or her intention to do so, will arrange for the best translation services which can be provided under the circumstances.

DATED this 31st day of January, 1983.



John O'Hara
Secretary
Railway Transport Committee



Information

Date:

For release December 14, 1982
Pour publication: Immediate

OTTAWA--The Canadian Transport Commission announced today that it is conducting an inquiry into the causes and circumstances of yesterday's collision in CP Rail's Winnipeg yard between six diesel engines and empty rail cars standing in the yard. The first four of the tank cars involved had contained propane.

Two cars were heavily damaged in the collision and a fire developed when one of the cars ruptured. One CP Rail employee was slightly injured when he jumped from the locomotives before the impact and a nearby building was evacuated as a precaution. However no further leakage was detected.

Under Section 226 of the Railway Act, the Commission has appointed Messrs E.L. Boggs, Chief, Safety and Services, Regional Office of the Railway Transport Committee in Winnipeg, and W.F. Karaskewich, Chief, Dangerous Goods Regulations Compliance, CTC Headquarters in Ottawa, to conduct the in-depth inquiry that will look into all matters likely to cause or prevent such an accident.

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M-TRAC

for rail safety

TECHNICAL ANALYSIS OF THE DANGERS
TO THE PUBLIC IN THE TRANSPORT
OF EMPTY HAZARDOUS GOODS TANK CARS

1983

M-TRAC

for rail safety

METRO TORONTO RESIDENTS' ACTION COMMITTEE

Suite 1802 181 University Avenue
Toronto M5H 3M7

Phone (416) 365-0301

S U B M I S S I O N

TO THE RAILWAY TRANSPORT COMMITTEE OF THE CANADIAN TRANSPORT COMMISSION

In the matter of the public inquiry into the railway accident
at Winnipeg, Manitoba, on December 13, 1982.

We have invited one of the most eminent authorities in the field of chemical explosives to analyse and determine the dangers to the public in the event of a derailment or other railway accident involving hazardous goods cars classified as empty or less than one carload lot under the Show Cause Decision of 1981.

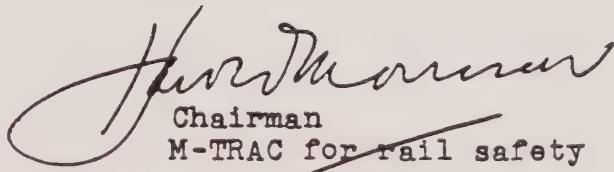
The document prepared by Professor D. H. Napier of the University of Toronto is attached and is submitted to the public inquiry under Subject No. 5 of Notice of Public Hearing dated January 31, 1983.

We respectfully submit that the dangers of the so-called "empty" hazardous goods tank cars can be so serious as to cause grave harm to the public in the event of a derailment or other railway accident.

We further remind the Commissioners that the Railway Transport Committee in the Show Cause Decision of 1981 determined that certain cities with heavy central populations face extreme difficulties in the evacuation of their people in the event of a chemical spill.

We therefore urgently plead with the Commissioners of this public inquiry to find that the dangers are of a kind that require the so-called "empty" hazardous goods cars to be included in the restraints imposed on certain hazardous goods cars under the Show Cause Decision of 1981.

February 16, 1983


Chairman
M-TRAC for rail safety

TO THE RAILWAY TRANSPORT COMMITTEE
OF THE CANADIAN TRANSPORT COMMISSION

In the matter of the public inquiry
into the railway accident at Winnipeg,
Manitoba, on December 13, 1982

ANALYSIS

DANGERS TO THE PUBLIC OF NON-PURGED
HAZARDOUS GOODS CARS CLASSIFIED AS
EMPTY

BY

D. H. NAPIER

B Sc M Sc Ph D C Chem FRSC
C Eng F Inst E

Professor of Industrial Hazard Control

University of Toronto

1983

OPINION

Hazard considerations relating to
unloaded ("empty") railway tank cars

The hazards from the failure or the rupture of loaded tanks on railcars are well-recognised and do not require full examination here. It is only necessary to state them as follows:

(1) Toxic materials. They may be in the form of liquefied gases, compressed gases or liquids with high vapour pressure. When containment is lost they offer a hazard to those who come within the influence of the gas/vapour dispersion. Many factors such as expired time, distance, atmospheric turbulence may reduce the danger. However those factors are not amenable to control. The situation is exacerbated by the fact that many loads carried on the railroads produce "heavy" vapours.

In addition consideration must be given to toxic liquids and both soluble and ^areactive solids that are toxic.

(2) Flammable materials. These may be gases liquefied under compression, compressed gases, refrigerated liquids and a range of liquids of varying vapour pressure. Under certain conditions loss of containment may lead to:

- (i) a pool or running fire
- (ii) an unconfined vapour cloud explosion (UVCE)
- (iii) a boiling liquid expanding vapour explosion (BLEVE) accompanied by a fire ball.

When the tank has been unloaded it is most unlikely that it will be entirely empty. In practice tanks are usually dedicated, and the only times when they are emptied and gas-free is for cleaning, testing or repair. Thus after unloading the following situations obtain with reference to (1) and (2) above.

The toxic hazard . presented by the tank is reduced due to the vast reduction of toxic material available. However, if the tank is breached a hazard remains to those who are in close proximity to the tank at the time of the rupture. Clearly the risk is very much reduced.

Neither a UVCE nor a BLEVE is possible in that there is insufficient fuel to produce either of these events. The same is true for the pool and the running fires. The risk of these events is therefore removed.

However after unloading a new situation arises with tanks that held flammable gases, liquids and vapours. If such a tank is breached in either a collision or a derailment or failure of the tank or its fittings occurs air may enter the tank.

The flammable gas/vapour will mix with air and if there is a source of ignition present, combustion will occur in confinement. Sources of ignition are not usually wanting in the situation of a railroad incident. Thus the combustion will produce a rapid increase by up to 10 times the initial value. The ability of relief valves to handle this pressure is limited and the rupture already postulated will be of inadequate dimensions in the scenario depicted above.

Thus an explosion is produced and it may result in one or more of the following:

- (i) a blast wave
- (ii) break-up of the tank
- (iii) rupture spreading from "stress-raisers" implanted by the first rupture
- (iv) fittings may break loose and become missiles
- (v) parts of the tank may become projectiles

Thus the net result of thos event involving an "empty" tank that originally carried flammable materials is the production of a greater or lesser blast wave with lesser or greater weight of missiles.

The energy of the explosion may be expressed in terms of a TNT equivalent and can be illustrated by reference to a propane tank. For every unit of volume of tank that originally carried 10 tonnes of propane, the TNT equivalent on ingress of air into the "empty" tank is 14kg. Thus if the tank originally contained 30 tonnes of propane then it is unloaded and later the "empty" tank full of propane gas is ruptured, thereexists the possibility of an explosion equivalent to up to about 40kg of TNT.

The effect of such an explosion may in turn be expressed in terms of the distance to which 50% breakage of glass windows occurs. The strength of glass is not precisely known; at best it can be expressed as a statistical value. Two values of scaled distance (S.D.) have been taken in the table below viz $40\text{m kg}^{-\frac{1}{3}}$ and $80\text{m kg}^{-\frac{1}{3}}$.

Size of tank (tonnes)	TNT equivalent (kg)	Approx. distance for 50% window breakage (m)	
		S.D. 40	S.D. 80
10	14	95	190
20	28	120	245
30	42	140	280
40	56	155	305
60	84	175	350

In practice due to imperfect mixing and premature explosion these TNT equivalents are unlikely to be attained. Further the window glass is likely to be neither as weak or as strong as indicated although the quality of fixing is likely to influence the failure of the windows. The table gives an indication of the extent of light damage from variously sized tanks.

Unfortunately such damage although light i.e. not structural, is universally recognised as very dangerous to persons who may suffer various injuries and effects from flying glass.

At lesser distances from the centre of explosion the effects will be more severe. Thus structural damage may be sustained by buildings that are immediately adjacent to the railroad. Of greater importance is the effect of such explosions upon persons

At short distances from a blast wave that is emanating from a vessel that is breaking up the precision with which effective distances can be given is less. The matter will therefore be expressed in terms of overpressure (i.e. pressure greater than ambient). There are two limits that have by implication been set so far.

- (i) the overpressure at the exploding tank will be about 1000kPa
- (ii) the overpressure required to break windows will be of the order of 2kPa

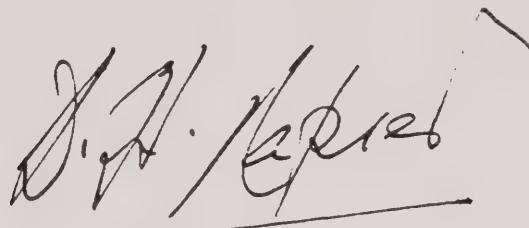
Within these limits the following are pertinent

- (a) onset of damage to eardrums: 30kPa
- (b) threshold of lung damage: 90kPa

Behind the blast front there is gas flow, an effect that is often referred to as windage. Windage imparts velocity to persons and objects thus causing them to become projectiles. Injury to persons results from this either by collision with a sharp object e.g. metal railings, structural steel or by sudden deceleration by encountering a solid mass e.g. the ground or a brick wall. Damage in such cases includes open wounds, broken skull and death.

From the foregoing it is clear that the situation with "empty" tanks amounts to trading one hazard for another. In some cases the hazard produced by a tank containing flammable materials is a localised fire. It is possible for the effects to be relatively small and localised. Accidents involving "empty" tanks can, as already described, lead to explosions. The effects of these will be more widespread than a localised fire. Thus the position arises where it is credible to think in terms of the hazard of an "empty" tank as being greater than that of a full one. This comment does not apply to situations where UVCE's and BLEVE's occur.

Thus it may be concluded that precautions taken to prevent disaster with full tanks of flammable materials are likely to be equally applicable to railcars with tanks that have been "emptied".



D.H.Napier B.Sc., M.Sc., Ph.D., C.Chem.,
FRSC., C.Eng., F.Inst.E.

Professor of Industrial Hazard Control
University of Toronto

February 12th 1983.

Appendix III



INTERNATIONAL REPORTING INC.

I

CANADIAN TRANSPORT COMMISSION RAILWAY TRANSPORT COMMITTEE

5 IN THE MATTER OF a public inquiry into a railway accident that occurred on December 13, 1982 at Winnipeg, Manitoba wherein six Canadian Pacific Rail diesel locomotives, being assembled in a six-locomotive consists ("the consist") on Track #1 on the east end of the railway company's Winnipeg Diesel shop, moved west resulting in a side collision with another group of locomotives, whereupon the consist stopped, then moved east, accelerating to a high rate of speed, ran through two switches and a crossover, and collided with the west end of a group of 38 cars, sitting in yard track N-14 opposite mileage 1.72 Carberry Subdivision, some 600 feet east of the McPhillips Street underpass, with a resultant explosion and fire; the accident caused injuries to several railway employees and damage to six diesel locomotives, five rail cars and approximately 400 feet of track (tracks N-13 and N-14).

15 File No.: 47015.62

SITTING IN THE CAMPAIGN ROOM NORTH, HOLIDAY INN, IN THE CITY OF WINNIPEG, MANITOBA ON FEBRUARY 18, 1983 AT 9:00 A.M. LOCAL TIME.

PANEL

CHAIRMAN	B. R. WOLFE
COMMISSIONER	J. F. WALTER
COMMISSIONER	R. J. ORANGE

ALSO IN ATTENDANCE

Legal Counsel	K. W. Thompson
Director, Rail Operations	M. D. Lacombe
Chief, Safety and Services	E. L. Boggs
Equipment Standards Officer	H. S. Hibberd
Chief, Dangerous Goods	W. F. Karaskewich
Director, Information Services	P. Schnobb

30 CERTIFIED REPORTERS



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BOGGS cr ex (Morrison)

BP/ES

5 Q. Would you not have knowledge of the volume
of dangerous product?

A. Even had I, I couldn't give you that.

10 Q. Would you have an indication of the speed
that this dangerous product crosses Winnipeg?

15 A. Well, they have certain gateway areas, what
we call gateway areas, which were gateways to the census
metropolitan area and within that specific gateway to the
terminal there is a speed limitation and the speed limitation is
dependent upon whether or not an inspection has been made or
whether there has been a hot box detector there.

We monitor on the basis of what speeds the trains
are operating on.

20 Q. Mr. Boggs, say there is a hot box dectector
in place and there is a gateway inspection, at what speed would
that ---

25 THE CHAIRMAN: Mr. Morrison, we are now out of the
yard, we are into gateway inspections and the movement of trains
outside of the yard and at the moment I will try to encourage you
to direct your questions to the final report within the terms of
reference Mr. Boggs has been sent into the yard to do.

30 MR. MORRISON: Mr. Chairman, I am really
addressing myself to Page 3 of the terms of reference, Item No. 5,
that changes ---

THE CHAIRMAN: I understand that.

CERTIFIED REPORTERS

P. 446 follows.



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BOGGS cr ex (Morrison)

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MR. MORRISON: And all I am trying to get from the witness, does he know the speed at which these dangerous products cross Winnipeg.

That is, not the empties, but the full tank cars.

MR. BOGGS: Mr. Chairman, am I dealing with the census metropolitan areas or am I dealing with the accident as it occurred?

MR. THOMPSON: Mr. Chairman, I might respond to that.

THE CHAIRMAN: Mr. Thompson.

MR. THOMPSON: The appointment that was made that appointed Mr. Boggs and Mr. Karaskewich reads "in the matter of an inquiry by the Canadian Transport Commission into the causes of and circumstances connected with the collision between locomotives and a batch of railway cars in CP Rail's Winnipeg yard in the Province of Manitoba on December 13th, 1982 and into all particulars relating thereto." Now, that is not an unduly restricted assignment, but certainly as I read it is an assignment that stops far short from what I regard as some kind of an attempted rehash of the show cause hearings that were held by the Commission, and on that basis I believe they're outside the scope of this inquiry.

THE CHAIRMAN: Thank you, Mr. Thompson, that was the point that I was trying to convey to Mr. Morrison in his line of questioning, if he could concentrate on the area within the



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BOGGS cr ex (Morrison)

/3
5 definition of the accident investigation in the Winnipeg yard, and I would encourage you, Mr. Morrison, to please concentrate on that area.

10 MR. MORRISON: Is it not possible, Mr. Chairman, just to get from the witness an idea of the speed at which this dangerous product crosses Winnipeg, that's all I'm asking.

15 THE CHAIRMAN: It has nothing to do with the inquiry.

MR. MORRISON: Well, isn't that the purpose ---

20 THE CHAIRMAN: Perhaps when the CP witnesses are available you might put the same question to them and they might 15 be able to tell you.

MR. MORRISON: Is it not a question of whether or not in fact he monitors the speed?

25 MR. THOMPSON: I might point out, Mr. Chairman, that in this case the dangerous commodities car wasn't moving even 20 at the rate of one inch per year, it was stopped. It was the locomotives that were moving.

MR. CHAIRMAN: Mr. Thompson, further to your point, 25 Commissioner Walter has just reminded me that the show cause order report which is in the public domain, covers the very point that Mr. Morrison is addressing himself to, so that if you want to talk about speeds, they are all in there.

30 MR. MORRISON: Mr. Chairman, I don't know what the speed is in Winnipeg, I am asking this witness who has the authority to monitor these speeds, in fact is instructed by the



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Appendix IV

I

CANADIAN TRANSPORT COMMISSION

RAILWAY TRANSPORT COMMITTEE

5 IN THE MATTER OF a public inquiry into a railway accident that occurred on December 13, 1982 at Winnipeg, Manitoba wherein six Canadian Pacific Rail diesel locomotives, being assembled in a six-locomotive consist ("the consist") on Track #1 on the east end of the railway company's Winnipeg Diesel Shop, moved west resulting in a side collision with another group of locomotives, whereupon the consist stopped, then moved east, accelerating to a high rate of speed, ran through two switches and a crossover, and collided with the west end of group of 38 cars, sitting in yard track N-14 opposite mileage 1.72 Carberry Subdivision, some 600 feet east of the McPhillips Street underpass, with a resultant explosion and fire; the accident caused injuries to several railway employees and damage to six diesel locomotives, five rail cars and approximately 400 feet of track (tracks N-13 and N-14).

10

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File No.: 47015.62

20 SITTING IN THE CAMPAIGN ROOM SOUTH, HOLIDAY INN, IN THE CITY OF WINNIPEG, MANITOBA ON MAY 17, 1983 AT 9:00 A.M. LOCAL TIME.

25

Panel

CHAIRMAN	B. R. WOLFE
COMMISSIONER	J. F. WALTER
COMMISSIONER	R. J. ORANGE

30

ALSO IN ATTENDANCE

Legal Counsel	K. W. Thompson
Director, Rail Operations	M. D. Lacombe
Chief, Safety and Services	E. L. Boggs
Equipment Standards Officer	H. S. Hibberd
Chief, Dangerous Goods	W. F. Karaskewich



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5 public interest document. It expresses concern about empties, and I presume that this is the sum total of this representation, that there is no further interpretation of it, fortification of it, or other modification thereof.

10 THE CHAIRMAN: You intend to file the letter; is that correct, Mr. Behrend?

15 MR. BEHREND: Yes. I was referred to bring it before the Panel.

20 THE CHAIRMAN: I realize that this is a time of restraint and constraint, but for the Mayor to let you become the unofficial courier, may cause some problems for Mr. Warren of Canada Post, because I am sure that the Mayor knows where to reach me; he has on many an occasion.

25 MR. BEHREND: Well, it seems -- I'm only surmising -- that it was expeditious to pass it to me to deliver.

THE CHAIRMAN: Thank you very much, and I will let Mayor Eggelton know that we received it.

MR. THOMPSON: We will then introduce that as a public interest document.

25 THE HEARING PROCESS OFFICER: Public Interest No. 13.

THE CHAIRMAN: PI 13.

30 Have you another item, Mr. Behrend?

MR. BEHREND: Well, there is one last one that I wish to make, Mr. Chairman, and it is -- you may recall, on



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5 March 2nd, 1983, you issued a statement and it was given wide distribution in the media, namely, to the effect that our organization had raised the question of the empties at the show cause hearing of '81, and that our suggestion had been rejected by the RTC bearing on the question of the treatment of empty dangerous goods cars.

10 On April 29th, I brought this error in fact, to your attention, Mr. Chairman, in the hope that it would be acknowledged as inherently wrong, since to some extent, it cast a shadow on the integrity of our humble organization.

15 You referred the matter to the RTC Senior Counsel, Mr. Thompson, who, on April 28th, on page 2728 of the transcript, dealt with the matter in a manner which we find unacceptable.

20 He has stated clearly that, at the time of the show cause hearing, he had no indication that the so-called empties were dangerous; that we were, in effect, content with the show cause decision specifying restrictions on dangerous goods of one carload or more.

25 We made clear that after the Madonte Township derailment on February 28th, 1982, the dangers of these so-called empties had been brought to our attention by the scientific community, and following our investigation, pursued the matter vigorously with the RTC, as the correspondence with the RTC shows.

30 Mr. Thompson's response on April 28th, suggests



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5 that we may have equivocated on this issue and that we seem to be unsure of when we first became concerned.

10 We ask again, Mr. Chairman, that this statement which you have issued on March 2nd, 1983, be withdrawn as an error in fact, and that the record shall show that this was, in fact, a mistake on the part of the RTC.

15 Thank you.

20 MR. THOMPSON: The statement that I made on the record during the last days clearly indicate that we acknowledge what he has just now said. I don't know wherein lies the difficulty. He discovered the issue of empties after Madonte; that is his evidence; that is his statement.

25 He did not raise the issue of empties at the show cause hearing. It had not occurred to them, at that point, to do so. That is the statement that I made at the last session. How much clearer I can be, I do not know.

THE CHAIRMAN: Thank you, Mr. Thompson.

Thank you, Mr. Behrend.

25 We will take an adjournment for 10 minutes.

THE HEARING PROCESS OFFICER: All rise.

30 --- Upon recessing at 3:41 p.m.

30 --- Upon resuming at 3:53 p.m.

THE HEARING PROCESS OFFICER: Order please.

Appendix V

COPIES OF PHOTOGRAPHS OBTAINED
BY K-TRAC AND SUBMITTED TO THE
RTC WINNIPEG PANEL ON APRIL 25, 1982

(reduced size)



Winnipeg CPR Yard, Dec. 13, 1982 (W. Glowacki, Winnipeg Free Press)



Ruptured EMPTY Tank Car, Winnipeg CPR Yard
Dec. 13, 1982 (W. Glowacki, WFP)



Ruptured EMPTY Tank Car, Winnipeg CPR Yard
Dec. 13, 1982 (W. Glowacki, WFP)

Appendix VI

EXTRACT FROM TRANSCRIPT

CANADIAN TRANSPORT COMMISSION

RAILWAY TRANSPORT COMMITTEE

SITTING IN THE CAMPAIGN ROOM SOUTH, HOLIDAY INN, IN THE
CITY OF WINNIPEG, MANITOBA, ON APRIL 25, 1983.

- - -

Pages 2422
2423
2424
2425

reporting on the evidence of Mr. Samson of CP Rail
under cross-examination following the submission
by M-TRAC of photographs showing the location and
condition of a chemical tank car placarded EMPTY
and last containing propane, massively damaged in
an explosion and fire in the CP Rail Winnipeg
yard on Dec. 13, 1982.

- - -

April 25, 1983



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SAMSON/SMITH cr ex
(Morrison)

Q. Possibly.

THE CHAIRMAN: To clarify it for the transcript, can you unequivocally say it is you or not you, that is the question.

THE WITNESS: I cannot see the face, sir, and it looks like a parka that I do have. And I was wearing shoes as I was ready to go home.

COMMISSIONER WALTER: Safety shoes?

THE WITNESS: Not safety shoes. Not boots.

THE CHAIRMAN: Okay.

MR. BOWLES: I always thought he took his shoes off after an explosion.

BY MR. MORRISON:

Q. Quite a good photograph, Mr. Samson, is it not?

MR. SAMSON: Very good.

Q. Does it tell you anything different from what you see on that drawing of CP-4?

MR. SAMSON: Well, the drawing shows it in one location, if this is what you are implying.

Q. This is also shows it straddling three tracks.

MR. SAMSON: It does, the drawing does.

Q. Whereas, if you look at the photograph, Mr.



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SAMSON/SMITH cr ex
(Morrison)

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Samson, you will see that the one section of the half, probably one half of the tank car is lying on one track parallel to the track and the other section is lying on the other track, again parallel to the track, probably with a gap maybe 30, 40, 30, 20 feet.

MR. SAMSON: I would say, yes.

Q. Are you a party to the people, Mr. Samson, who gather the information to make this drawing which was submitted as evidence before this panel?

MR. SAMSON: I was not.

Q. Did anybody in the company ask you to contribute information which allowed them to arrive at this drawing?

MR. SAMSON: All I was asked is the consist numbers of the locomotives.

Q. So you cannot account for the fact there is a difference between these photographs and the drawings? As a matter of fact those drawings are also in CP-28, I think, if you look in the --- Appendix 1 I believe it is.

MR. BOWLES: CP-4 is the same diagram, Mr. Chairman.

THE CHAIRMAN: Sorry?

MR. BOWLES: CP-4 is the same diagram that was produced as an exhibit. It is also the one that he is referring to as Appendix 1 in that blue booklet.



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SAMSON/SMITH cr ex
(Morrison)

- 24.24 -

THE CHAIRMAN: Could we have a question.

BY MR. MORRISON:

Q. I am sorry. I just want to know whether it was the same sort of drawing that you see in Appendix 1 and in Exhibit No. 28.

MR. SAMSON: Yes.

Q. And there is no way that you know of or what information that you had given to the company to get them to point where they would make a drawing of that kind. You had no contribution to that drawing?

MR. SAMSON: No, sir.

Q. Would you think it would be too much of an exaggeration to say that that drawing is deceptive?

MR. SAMSON: All I can say is those are the unit numbers. That is all I know. But the drawing itself I am not familiar with.

Q. But what you saw on the ground at the site at the time you arrived there and what you see in this drawing is not the same thing, Mr. Samson.

MR. SAMSON: Well, according to your pictures, no.

Q. According to what you saw on the ground, Mr. Samson, at the time you arrived there, you walked by those two pieces.



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SAMSON/SMITH cr ex
(Morrison)

MR. SAMSON: That is correct.

Q. According to what you saw there, that drawing is wrong, is it not?

MR. SAMSON: According to this drawing it is wrong. I do not follow the reason for the drawing, really.

Q. I do not either.

MR. SAMSON: I see this ---

Q. It is presented as evidence by the Canadian Pacific.

MR. SAMSON: As an indication of impact area, the point of impact, and the units are separated from the impact area.

Q. Yes. I am not suggesting, Mr. Samson, that there is anything you have done to contribute to this but you were one of the first senior officers on the ground there.

MR. SAMSON: Yes.

Q. And it was your, I was going to say, your bravery in going into a fire environment and not knowing what you are going to find there. The speed by which you took into that area is commendable. The question that arises is what took place and we get a variety of stories coming out in evidence. And it is only by studying those two photographs and then studying this drawing or the drawings also in Appendix 1, we suddenly find a bit of a mystery.

